



ALL MIXED UP! (PUN INTENDED!)

Standard 3240-01 Students will observe and describe physical and chemical change.

Objective 3240-0102 Analyze factors that influence chemical and physical change.



Intended Learning Outcomes

- 1b. Develop and use categories to classify observations.
- 1d. Make estimations and predictions based on observations and current knowledge.
- 2b. Formulate research questions and hypotheses.
- 2d. Collect and record data using procedures designed to minimize error.
- 2e. Analyze data and draw warranted inferences.
- 5e. Solve problems by applying science principles and procedures.
- 6d. Construct tables, graphs, charts, diagrams, and models to describe and summarize data.

This challenging activity is an open-ended lab which takes time. Don't try to rush through it. It will test the experimental skill of your students. Your students will receive a small test tube containing salt, sand, iron filing, sawdust, and benzoic acid (a white solid that is soluble in hot water, but relatively insoluble in cold water). The students will design an experimental procedure that will allow them to separate the mixture and recover all five materials in their natural states (all are dry, granular solids) using the physical properties of the substances.

Materials

Students will receive a test tube with the mixture of 5 substances, a small cellophane bag and tape to store all recovered solids, two 50 ml beakers, filter paper, small funnel, magnet, and hot plate or burner. All other materials will be based on the requests of the students. Have each student submit an equipment list the day before to insure availability.

Mixture of the following ingredients: (Class of 36)

- 9.0 grams table salt
- 5.0 grams sand
- 6.0 grams iron filings
- 3.0 grams sawdust
- 11.0 grams benzoic acid
- 12 x 75 mm culture tubes containing 1 gram of the above mixture for each student

Procedure

Your writeup of this lab **will** include the following:

1. A statement of ***purpose***.
2. A list of ***equipment***.
3. ***Procedure*** followed in ***numbered*** steps.
4. A ***flow chart*** diagramming your procedure.
5. ***Results*** (the five components, separated and bagged) fixed to the flow chart in the appropriate places.
6. ***Discussion*** of the sources of error in your separation and recovery techniques. Also list things you might change next time to eliminate errors.
7. ***Discussion*** of the following statement: "Separation techniques depend upon one or more specific physical properties (not chemical) of the components being separated." Your discussion must include at least 5 concrete examples.

HINTS

Allow one class period to introduce the lab and the remaining time to discuss possible ideas, techniques, and equipment list. Tell students what materials you have available and have them bring in specialty items. Use a second day to demonstrate any techniques of separation unfamiliar to them. Allow a minimum of two days to do the actual lab. Allow a minimum of two days to do the actual lab. Have fun.

Safety concerns:



Teachers and students, be sure to keep all Chemical Safety Rules that are specified by your teacher and in all general laboratory experiences.

Reference: Robert Decker, St. Louis, Mo.



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